

ABSTRACT

A multi-stage charge pump apparatus and a method for powering and controlling the same is presented. Each stage of the charge pump includes an energy injection capacitor and a gate control capacitor to permit the transfer and accumulation of charge through the charge pump to an output through the use of transistor switches. The charge pump is driven by a pair of clock signals where the voltage swing of the clock signal driving the control gate capacitors is advantageously set to a higher level than that of the clock signal driving the energy injection capacitor. In this manner, the effect of bulk voltages in the later stages of the charge pump is overcome.